

7. Law of Returns to Scale

The law of returns to scale is applicable in the long run where all factors of production are in variable supply. In the long run output can be increased by increasing all the factors of production or the 'scale' of production.

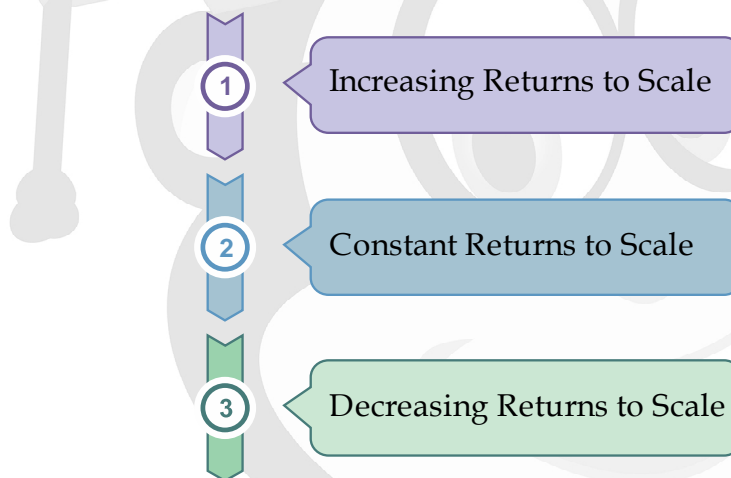
The law of returns to scale explains the proportional change in output with respect to proportional change in inputs. In other words, the law of returns to scale states when there are a proportionate change in the amounts of inputs, the behavior of output also changes.

“ According to Koutsoyiannis *"The term returns to scale refers to the changes in output as all factors change by the same proportion."*

According to Prof. Roger Miller *"Returns to scale refers to relationship between in change output and proportionate change in all factors of production."*

The law of returns to scale, states that when all factors of production are increased in the same proportion, output will increase but the increase may be at increasing rate or constant rate or decreasing rate

Three Types of Law of Returns to Scale



Explanation

$$P_1 = f(xL, xK)$$

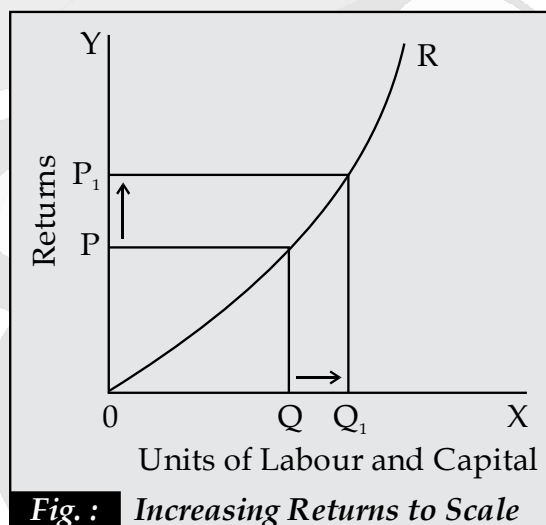
1. If P_1 increases in the same proportion as the increase in factor of production i.e., $\frac{P_1}{P} = x$, it will be constant returns to scale.
2. If P_1 increases less than proportionate increase in the factors of production i.e., $\frac{P_1}{P} < x$, it will be diminishing returns to scale.
3. If P_1 increases more than proportionate increase in the factors of production, i.e., $\frac{P_1}{P} > x$, it will be increasing returns to scale. Returns to scale can be shown with the help of table.

Table : Showing Different Stages of Return to Scale

Units of Labour	Units of Capital	%age Increase in Labour and Capital	Total Product	%age Increase in TP	Returns to Scale
1	3	–	10	–	
2	9	100%	30	200%	Increasing
3	9	50%	60	100%	
4	12	33%	80	33%	Constant
5	15	25%	100	25%	
6	18	20%	120	10%	Decreasing
7	21	16.60%	130	8.30%	

Increasing Returns to Scale

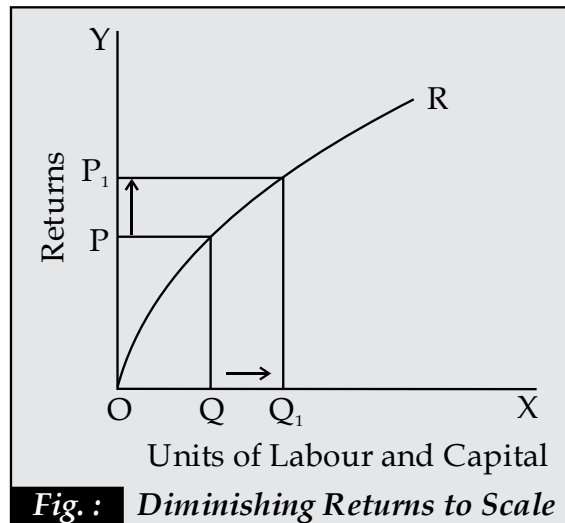
Increasing returns to scale or diminishing cost refers to a situation when all factors of production are increased, output increases at a higher rate. It means if all inputs are doubled, output will also increase at the faster rate than double. Hence, it is said to be increasing returns to scale. This increase is due to many reasons like division external economies of scale.



OX axis represents increase in labour and capital while OY axis shows increase in output. When labour and capital increases from Q to Q_1 , output also increases from P to P_1 which is higher than the factors of production i.e. labour and capital.

Diminishing Returns to Scale

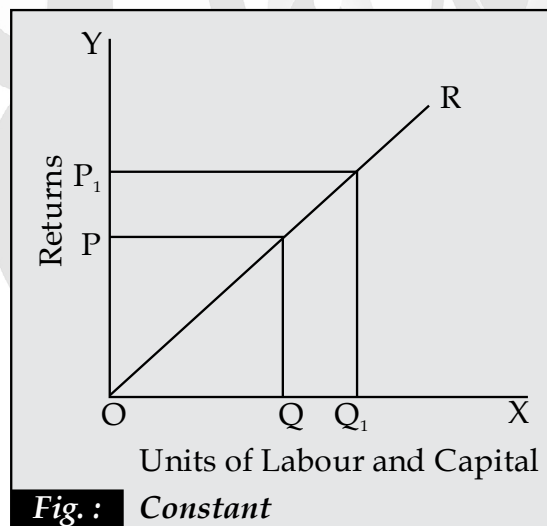
Diminishing returns or increasing costs refer to that production situation, where if all the factors of production are increased in a given proportion, output increases in a smaller proportion. It means, if inputs are doubled, output will be less than doubled. If 20 percent increase in labour and capital is followed by 10 percent increase in output, then it is an instance of diminishing returns to scale.



Constant

Constant returns to scale or constant cost refers to the production situation in which output increases exactly in the same proportion in which factors of production are increased. In simple terms, if factors of production are doubled output will also be doubled.

In this case internal and external economies are exactly equal to internal and external diseconomies. This situation arises when after reaching a certain level of production, economies of scale are balanced by diseconomies of scale. This is known as homogeneous production function. Cobb-Douglas linear homogenous production function is a good example of this kind.



Short Run Production

The **short run is a period** of time in which only one input (say labor) is allowed to vary while other inputs land and capital are held fixed. In the short run, therefore, production can be increased with one variable factor and other factors remaining constant. In the short run, the Law of Variable Proportion law of variable governs the production behavior of a firm.

The law of variable proportion shows the direction and rate of change in the output of firm when the amount of only one factor of production is varied while other factor of production are held constant.

The law of variable proportion passes mainly through two phases :

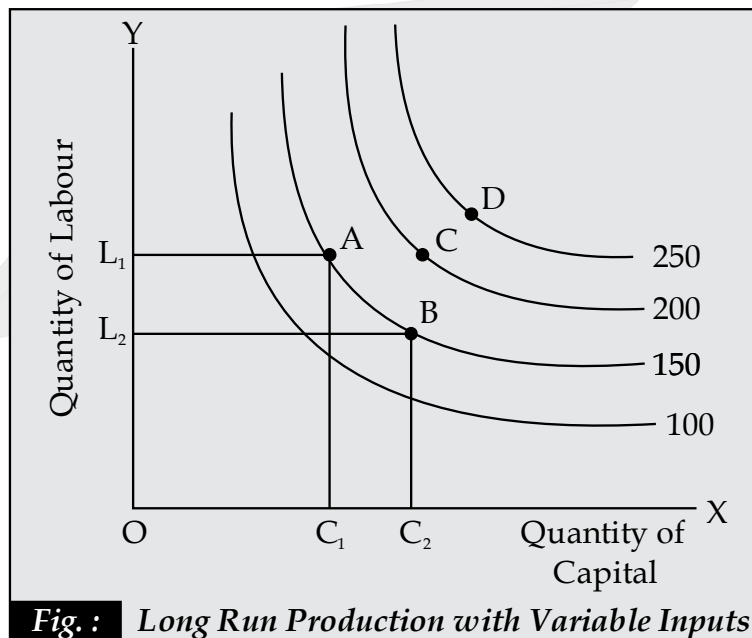
- (i) Increasing returns.
- (ii) Diminishing returns

Long Run Production With Variable Inputs

The **long run** is the lengthy period of time during which all inputs can be varied. There are no fixed inputs in the long run. All factors of production are variable inputs.

Now, we analyze production function by allowing two factors say labor and capital to vary while all others are held constant. With both factors variable, a firm can produce a given level of output by using more labor and less capital or a greater amount of capital and less labor or moderate amounts of both. A firm continues to substitute one input for another while continuing to produce the same level of output.

If two inputs say labor and capital are allowed to vary, the resulting production function can be illustrated in the figure.

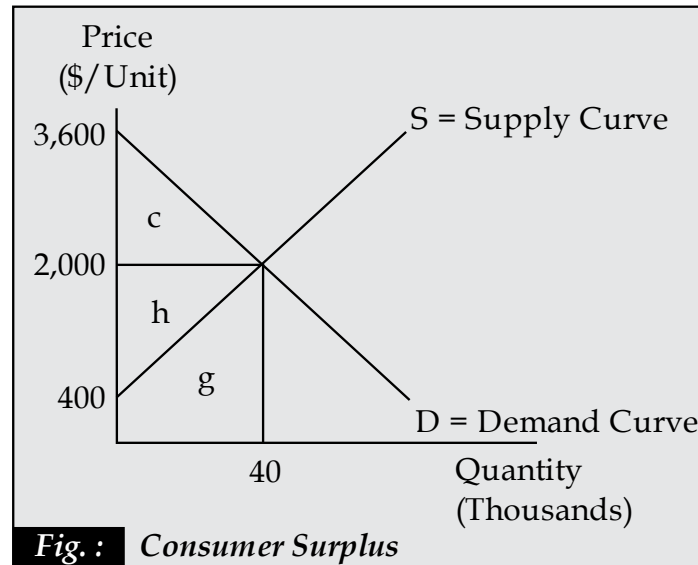


In this figure each curve (called an **isoquant**) represents a different level of output. The curves which lie higher and to the right represent greater output levels than curves which are lower and to the left.

Consumer Surplus

Consumer surplus is defined as the difference between the consumers' willingness to pay for a commodity and the actual price paid by them, or the equilibrium price.

Consumer surplus is defined as the difference between the total amount that consumers are **willing and able to pay** for a good or service (indicated by the demand curve) and the total amount that they actually do pay (i.e. the market price). Consumer surplus is shown by the area under the demand curve and above the price.



Consumer Surplus and Price Elasticity of Demand

How is consumer surplus affected by the elasticity of a demand curve ?

1. When the demand for a good or service is **perfectly elastic**, consumer surplus is zero because the price that people pay matches exactly what they are willing to pay.
2. In contrast, when demand is **perfectly inelastic**, consumer surplus is infinite. In this situation, demand does not respond to a price change. Whatever the price, the quantity demanded remains the same. Are there any examples of products that have such zero price elasticity of demand ? Perhaps the closest we get is a life-saving product with no obvious substitutes - in this situation, consumers' willingness to pay will be extremely high.
3. The majority of demand curves in markets are assumed to be downward sloping. When demand is inelastic (i.e. $Pe_d < 1$), there is a greater potential consumer surplus because there are some buyers willing to pay a high price to continue consuming the product. Businesses often raise prices when demand is inelastic so that they can turn consumer surplus into producer surplus!

Ques. Match the items of List-I with the items of List-II : (NTA UGC-NET June 2015 P-II)

List-I

List-II

- | | |
|--|-------------------------|
| (a) Law of diminishing marginal utility | (i) Cross demand |
| (b) Relationship between price of one commodity and demand for other commodity | (ii) Oligopoly |
| (c) Skimming the cream policy | (iii) Cardinal approach |
| (d) Price rigidity | (iv) Pioneer pricing |

Codes :

	(a)	(b)	(c)	(d)
(A)	(i)	(ii)	(iii)	(iv)
(B)	(iii)	(i)	(ii)	(iv)
(C)	(ii)	(iv)	(i)	(iii)
(D)	(iv)	(iii)	(ii)	(i)

Ans. (C) Correct match is given below :

- Law of diminishing marginal utility - Oligopoly
- Relationship between price of one commodity and demand for other commodity - Pioneer pricing
- Skimming the cream policy - Cross demand
- Price rigidity - Cardinal approach

Ques. The Marshaling utility analysis is based on a less valid assumption of :

(NTA UGC-NET Dec. 2015 P-II)

- (1) Cardinal measurability of the utility
- (2) Given marginal utility of money
- (3) Diminishing marginal utility of the goods
- (4) Additives of the utility

Ans. (2) In Marshallian utility analysis, condition of consumer's equilibrium is that the marginal utilities of various goods are proportional to their prices. In other words, a consumer is in equilibrium when he is distributing his money income among various lines of expenditure in such a way that,

$$\frac{\text{MU of X}}{\text{Price of X}} = \frac{\text{MU of Y}}{\text{Price of Y}} \text{ and so on.}$$

Ques. Ordinal utility analysis of the consumer's behavior is considered superior to the cardinal utility analysis mainly due to

(NTA UGC-NET July 2016 P-II)

- (1) assumption of the rationality of the consumer's behavior.
- (2) possibility of the derivation of the consumer's demand.
- (3) bifurcation of price effects into income and substitution effects.
- (4) consideration of the available limited resources for satisfying consumer's demand.

Ans. (3) Ordinal utility analysis of the consumer's behavior is considered superior to the cardinal utility analysis mainly due to bifurcation of price effects into income and substitution effects.

Ques. *What is customer value?*

(NTA UGC-NET Dec. 2012 P-III)

- (A) *Ratio between the customers' perceived benefits and the resources used to obtain these benefits.*
- (B) *Excess of satisfaction over expectation.*
- (C) *Post purchase dissonance*
- (D) *None of the above*

Ans. (A) *Ratio between the customers' perceived benefits and the resources used to obtain these benefits.*



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